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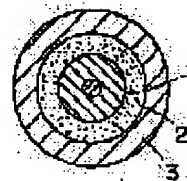
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(54) OPTICAL FIBER CORD

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain enough tensile characteristics, flexibility and transmission characteristics and to obtain <1.2mm outer diameter which is effective to produce a multicore optical fiber by forming an aggregated layer of high tensile force fiber around a resin coating film and forming a thermoplastic resin sheath around the fiber layer.

SOLUTION: Coated optical fiber 1 produced by coating optical fiber with a UV-curing resin to 0.4-0.65mm outer diameter is arranged in the center and an aggregated layer 2 of high tensile force fibers prepared by spinning from a liquid phase of polyparaphenylene benzo bisoxazole is formed around the fiber 1. Then a thermoplastic resin sheath 3 is formed around the aggregated fiber layer 2. Namely, in order to decrease the diameter of an optical fiber cord by decreasing the amt. of tensile force fibers while to satisfy tensile characteristics required for an optical fiber cord (<0.65% distortion in the optical fiber when 10kgf load is added), a high tensile force fiber prepared by spinning polyparaphenylene benzo bisoxazole in a liquid phase is used. Further, the ratio of the cross-sectional area of the high tensile force fiber between the outer surface of the coated optical fiber 1 and the inner surface of the thermoplastic sheath 3 is preferably 50-80%.



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DETAILED DESCRIPTION

[Detailed description]

[0001]

[The technical field to which invention belongs] this invention relates to the parvus single core optical fiber code of an outer diameter.

[0002]

[Prior art] Various properties, such as transmission characteristics, such as mechanical properties, such as a **** property, and C, ****, a lateral-pressure property, the temperature characteristic, and a bending property, and fire retardancy, are required of an optical fiber code. In order to satisfy these various properties, the single core optical fiber code used within the enclosure of an office has the following structures.

[0003] That is, it arranges focusing on nylon covering optical fiber core wire with an outer diameter of 0.9mm, and is 2 a 11,000 to 15,000 kgf/mm elastic modulus to the periphery. It is the structure which prepared the tensile-strength fiber set layer which gathered tensile-strength fiber by *****, and prepared the thermoplastics sheath in the periphery further. Polyaramide fiber (tradename Kevlar), tradename ***** (AKUZO), etc. are used for tensile-strength fiber. The outer diameter (outer diameter of a thermoplastics sheath) of a single core optical fiber code is 2.0mm with this structure.

[0004]

[Object of the Invention] Although the further multi-core-ization of an optical cable is desired in connection with the expansion of the optical-communication need of the future, if the storage space of the wiring section of the enclosure of the outer diameter of an optical cable and an office is taken into consideration, as for the outer diameter of a single core optical fiber code, it is indispensable to diameter[of thin]-ize to 1.2mm or less. However, nylon covering optical fiber core wire with an outer diameter of 0.9mm is used, when how to set the outer diameter of an optical fiber code to 1.2mm or less, then the tensile-strength fiber of an amount effective in a **** property are *****ed, the thickness of a thermoplastics sheath becomes thin too much, and the problem of a fall of a sheath piece or a friction property arises.

[0005] Moreover, while **** and a configuration will become it bad that an optical fiber code is good if the density of the tensile-strength fiber between optical fiber core wire and a thermoplastics sheath is made high, in order to make the outer diameter of an optical fiber code small, when connecting mutually the fiber optic connector attached in the edge, it becomes difficult for optical fiber core wire to be pushed and to withdraw in a sheath, and it becomes easy to generate the buckling of optical fiber core wire etc. Moreover, if the outer diameter of optical fiber core wire tends to be made small and it is going to diameter[of thin]-ize an optical fiber code, the lateral-pressure property which is an important transmission characteristic will become bad.

[0006] In view of the above troubles, on use, it has **** and a transmission characteristic as it is good, and the purpose of this invention is to offer [sufficient **** property and] a single core optical fiber code with an effective in multi-core-izing of an optical cable outer diameter of 1.2mm or less.

[0007]

[The means for solving a technical problem] It is characterized by having arranged the single core optical fiber code of this invention focusing on the optical fiber core wire which has resin covering with an outer diameter of 0.4-0.65mm, having prepared the set layer of the tensile-strength fiber which carried out the liquid crystal spinning of the ***** phenylene ***** diazole to the periphery, and preparing a thermoplastics sheath with an outer diameter of 1.2mm or less in the periphery. As optical fiber core wire with an outer diameter of 0.4-0.65mm, the optical fiber core wire which covered the ultraviolet-rays hardenability resin can be used for an optical fiber.

[0008] In this invention, the amount of tensile-strength fiber is made fewer than the former in diameter[of thin]-izing of an optical fiber code, and in order to satisfy the **** property (0.65% or less of optical fiber asymmetry at the time of 10kgf load) required of an optical fiber code, the tensile-strength fiber which carried out the liquid crystal spinning of the ***** phenylene ***** diazole is used. this tensile-strength fiber -- an elastic modulus -- 25,000kgf/mm² it is .

[0009] In order to satisfy the **** property demanded, it is desirable to make the amount of the tensile-strength fiber to use into 900 deniers or more. Moreover, since it becomes impossible to take the thickness of a thermoplastics sheath enough if an amount has too much tensile-strength fiber, as for the amount of tensile-strength fiber, considering as 2000 deniers or less is desirable. Therefore, 900-2000 deniers of the amounts of the tensile-strength fiber to use are 1000-1500 deniers preferably.

[0010] It is desirable to set to the single core optical fiber code of this invention furthermore, and to make the cross-section pulse

duty factor of the tensile-strength fiber between the periphery side of optical fiber core wire and the inner skin of a thermoplastics sheath into 50 - 80%. If the cross-section pulse duty factor of tensile-strength fiber is ****ed to 50% or more, there is little complementary length of the tensile-strength fiber contained in an optical fiber code, and since the force in which the function of tensile-strength fiber is demonstrated and it is applied to optical fiber core wire is small and ends, the amount of asymmetry of an optical fiber can be small stopped in the state of the first stage when tensile force was applied to the optical fiber code. Moreover, when a fiber optic connector will be attached in an optical fiber code and a fiber optic connector will be mutually connected while **** becomes it good that an optical fiber code is good if the cross-section pulse duty factor of tensile-strength fiber is carried out to 80% or less, the complementary length of the optical fiber core wire which optical fiber core wire is pushed in the orientation of an axis, and produces enters in a sheath, and a possibility that the buckling of optical fiber core wire may arise disappears. Moreover, the grade of **** of an optical fiber code is also small, and installation of a fiber optic connector is also easy for it. [0011] Therefore, 50 to 80%, the cross-section pulse duty factor of the tensile-strength fiber between an optical fiber core-wire periphery side and thermoplastics sheath inner skin can fully satisfy ****, core-wire complementary length receipt nature, and a **** property as it is desirable and 60 - 70%, then an optical fiber code are good.

[0012]

[Gestalt of implementation of invention] It has arranged focusing on the optical fiber core wire 1 which covered the ultraviolet-rays hardenability resin to the optical fiber as shown in drawing 1, and the single core optical fiber code of the various sizes shown in Table 1 (examples 1-6) and 2 (examples 1-5 of a comparison) was manufactured, and the single core optical fiber code which formed the set layer 2 of the tensile-strength fiber which carried out the liquid crystal spinning of the ***** phenylene ***** diazole to the periphery, and formed the thermoplastics sheath 3 in the periphery measured and estimated various properties.

[0013]

[Table 1]

実施例		1	2	3	4	5	6
20 .6	光ファイバ心線外径 (mm)	0.40	0.40	0.45	0.45	0.50	0.65
	構 抗張力繊維量 (デニール)	970	1460	970	1460	1460	1460
	成 コード外径 (mm)	1.0	1.0	1.0	1.0	1.1	1.2
	シース厚さ (mm)	0.22	0.20	0.20	0.18	0.20	0.
	繊維の断面積占有率 (%)	57.2	65.9	55.8	63.6	54.9	60
	特性	光ファイバの歪み	○	○	○	○	○
		コード扁平率	○	○	○	○	○
		可とう性	○	○	○	○	○
	特性	側圧特性	○	○	○	○	○
		温度特性	○	○	○	○	○
		曲げ損失	○	○	○	○	○

○ : 合格 × : 不合格

[0014]

[Table 2]

made the cross-section pulse duty factor of tensile-strength fiber larger than 80%, and the oblateness of an optical fiber code became large too much in this case, and it turns out that trouble arises in installation of a fiber optic connector.

[0024]

[Effect of the invention] As explained above, the single core optical fiber code with an outer diameter of 1.2mm or less which according to this invention is in a **** property and the level in which **** and an oblateness do not have a use top problem as it is good, and satisfies the value as which the transmission characteristic of a lateral-pressure property, the temperature characteristic, and a bending property is moreover required of the single core optical fiber code which is the conventional outer diameter of 2.0mm can be obtained. Therefore, if this single core optical fiber code is used, there is an effect remarkable in multi-core-izing of an optical cable.

[Translation done.]